Social Psychology for Understanding Recreational Fishers and Fisheries

Adam C. Landon, Susan A. Schroeder, Susan F. Steffen, and Robert Arlinghaus

Abstract Social psychology is a diverse sub-discipline in psychology and sociology concerned with the effects of the social and physical environment on individuals' cognitions and behaviours. The human dimensions literature has a long history of adopting and extending concepts from social psychology to understand the cognitions and behaviours of recreational fishers, and the well-being outcomes of participation. In this chapter, we present a novel integrated conceptual model of the fishing experience from the perspective of social psychology. We use this model to review and synthesize the relevant literature on social psychology as applied to understand recreational fishers. Key elements of the model, and our review, include the cognitive antecedents of fishers' preferences for fishing experiences, the relation between preference, intention, and behaviour, and the post-behavioural well-being outcomes of fishing participation.

Keywords Cognition · Fisher behaviour · Preference · Social psychology · Well-being

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1 Introduction

Participation in recreational fishing involves choices about where to fish, when to fish, how to fish, what to fish for, and with whom, among many others (Hunt et al. 2019). These choices are conditioned on recreational fishers' preferences (e.g., Oh et al. 2005; Beardmore et al. 2013), the broader context in which the activity exists (e.g., Hunt and Ditton 1997; Hunt et al. 2013), and a plethora of other fishers' attributes (e.g., Aas and Ditton 1998; Arlinghaus and Mehner 2005). Diverse social science fields offer explanations of the processes that underpin the formation of fishers' preferences, the relationship between fishers and their context, their choices, and the outcomes that participation may generate (Aas and Ditton 1998). In this chapter, we review the social psychological approach for understanding recreational fisher behaviour and the implications of participation in recreational fisheries for well-being.

Social psychology is a sub-discipline within both psychology and sociology concerned with the influence of the social and physical environment on individuals' cognitions (i.e., values, beliefs, attitudes, and norms), emotions, and behaviours (Eagly and Chaiken 1993; Mitchell 2009). Like microeconomists and microsociologists, social psychologists are interested in understanding the collective action of individual people. Social psychologists focus on understanding how diverse cognitions (e.g., values, beliefs, attitudes, and norms) work together to affect a behavioural choice (Homer and Kahle 1988), and the relationship between those choices and their psychological underpinnings with the environment. Fishers exhibit great diversity in their fisheries-related cognitions (Fedler and Ditton 1986, 1994; Salz and Loomis 2005; Anderson et al. 2007) and behaviours (Bryan 1977; Sutton and Ditton 2001; Murphy Jr et al. 2019), and here the theories and methods of social psychology offer plausible accounts for that diversity (Hunt et al. 2023).

Many of the key human dimension's concepts of interest to recreational fisheries research and management fall under the umbrella of social psychology (Aas and Ditton 1998; Parkkila et al. 2010). This is, in part, because many of the pioneering scholars that studied recreational fisheries from a social perspective (e.g., Robert B. Ditton at Texas A&M, USA) had training in psychology or applied disciplines relying on such frameworks (e.g., outdoor recreation studies, Ditton 1996). It is also, in part, a function of the utility of social psychological concepts to management. For example, fishers' satisfaction with fishing experiences (Birdsong et al. 2021), motives related to recreational fishing (Fedler and Ditton 1994) and fishers' attitudes toward fisheries management (Arlinghaus and Mehner 2005) are of great interest to fishery managers, with all three concepts (satisfaction, motives, and attitudes) being psychological constructs (Heberlein 2012; Manning 2022). Research rooted in social psychology explains what contributes to fishers' satisfaction with fishing experiences (Hendee 1974; Dorfman 1979; Gundelund et al. 2022), and their beliefs, norms, and attitudes toward fisheries management (Manfredo et al. 1995; Schroeder et al. 2018), among numerous other critical topics (Aas and Ditton 1998).

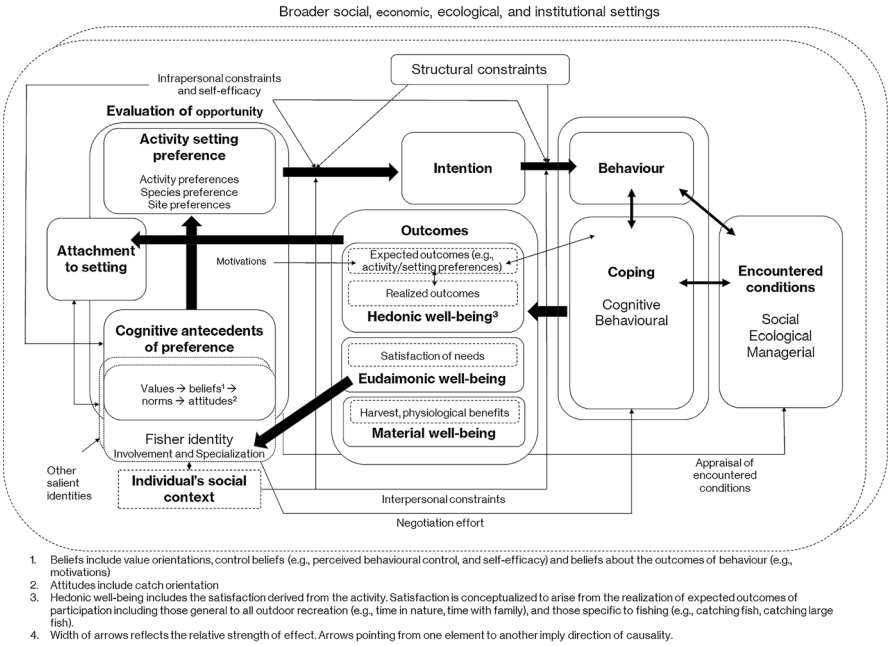

Fig. 1 Conceptual framework of the social-psychological dynamics of participation in fishing

Past studies examining recreational fisheries from the perspective of social psychology, often referred to as "human dimensions" (Hunt et al. 2013), have drawn on diverse research paradigms and concepts and focused on disparate elements of the fishing experience (Aas and Ditton 1998; Fenichel et al. 2013). This diversity of concepts might be confusing to those not formally trained in applied psychological sciences. To provide some structure and thereby help the social scientific study of recreational fishers and fisheries, we present a novel integrated conceptual framework of the fishing experience from the perspective of social psychology (Fig. 1). The model includes those factors that affect fishers' choices about fishing through to the benefits they derive from participation. The model outlines and organizes the key concepts in past studies from a social psychological research perspective (e.g., motives, beliefs, attitudes, preferences, constraints, satisfaction), shows their relationships, and accounts for the underlying mechanisms that explain them. We note that, like utility maximization as a guiding behavioural driver in microeconomics (see Melstrom et al. 2026; Parkkila et al. 2010), most theories underlying the social psychological concepts and their relations (Fig. 1) are fundamentally rational actor theories (Elster 1988, 1989). That is, a key assumption is that choices made by humans are conditioned on the desire to achieve satisfaction of preference and are rooted and influenced by a set of interrelated cognitions (e.g., values, beliefs, norms, attitudes) that individual people hold (Hausman 2011). For example, the cognitive hierarchy model (Homer and Kahle 1988) assumes that general values inform more specific beliefs, which in turn inform even more specific

attitudes that ultimately direct behavioural intent and behaviour. Therefore, cognitions as conceptualized in social psychology are underlying reasons for behaviour and they form behavioural decisions in a rational way (Elster 1988). For example, when recreational fishers make a specific choice, they would assume to draw on their underlying values and beliefs that in turn rationally drive concrete attitudes and behaviours. In this interpretation, behaviour is (typically boundedly) rational in that fishers evaluate choice alternatives using an internal set of cognitions (e.g., values, beliefs, norms, and attitudes), and choose from among those alternatives available to them; fishers' behaviours correspond to anticipated outcomes, both positive and negative. Leading social psychological theories, such as the reasoned action model (Fishbein and Ajzen 2010), also shown (Fig. 1), adopt a similar theoretical mechanism as the cognitive hierarchy to explain individual behaviour, but this model emphasizes more factors that affect personal behaviour, such as the degree of behavioural control. We synthesize the various concepts that psychologists have put forward to explain human behaviour and assume the most direct predictor of behavioural intent is preference (Fig. 1), in a manner analogous to its use in resource economics (Hunt et al. 2019).

We structure our review of key concepts in social psychology around the model (Fig. 1), including:

(a) The cognitive antecedents of fishers' preferences (e.g., values, beliefs, norms, and attitudes), followed by
(b) The relationship between preference, intention, and behaviour
(c) Fishers' negotiation of conditions encountered in the field that affect decisions, and
(d) The outcomes of the fishing experience on the individual participant (e.g., benefits and satisfaction).

To understand the logic of the framework (Fig. 1), we first provide a brief review of three distinct, but related, theoretical frameworks applied to understand the cognitions and behaviours of recreational fishers and that are therefore reflected in our conceptual model:

1. The cognitive hierarchy
2. The norm activation and value-belief-norm models
3. The reasoned action model

We begin by reviewing these theories to demonstrate the similarities among the theories and the need for integration, and to situate our arguments in the broader literature.

2 Social Psychological Behavioural Theories and Constructs

2.1 The Cognitive Hierarchy

Implicit in many social psychological theories of the antecedents of behaviour is a hierarchy of cognitions. Drawing on this assumption, many applied human dimensions scholars in the field of fish and wildlife have adopted this position as an explicit organizing framework for their inquiry (e.g., Vaske and Donnelly 1999; Whittaker et al. 2006), often under a banner of "the cognitive hierarchy". Other theoretical frameworks are common in research on human-environment interactions (e.g., Klöckner 2013), including the norm activation model (Schwartz 1977), value-belief-norm model (Stern et al. 1999; Stern 2000), and the reasoned action model (Fishbein and Ajzen 2010). All these basic models of human thought and action are consistent with a commitment to the existence of a hierarchy of cognitions that affect intent and behaviour. We use the term "the cognitive hierarchy" to describe studies using the existence of a hierarchy of cognitions to justify their assumptions about the causes of behaviour, but note that "a cognitive hierarchy" is implied by the other theoretical models described.

As alluded to previously, the cognitive hierarchy suggests the existence of an ordered set of cognitions internal to the individual (Homer and Kahle 1988). These cognitions range from the extremely specific and direct antecedents of behaviour like attitudes or intentions, to the very abstract and acontextual like values. We provide a graphical depiction of the assumptions of the cognitive hierarchy (Fig. 2). Each of these cognitions has a specific meaning and function. As these constructs transcend theoretical models, and confusion exists regarding their meaning as applied across

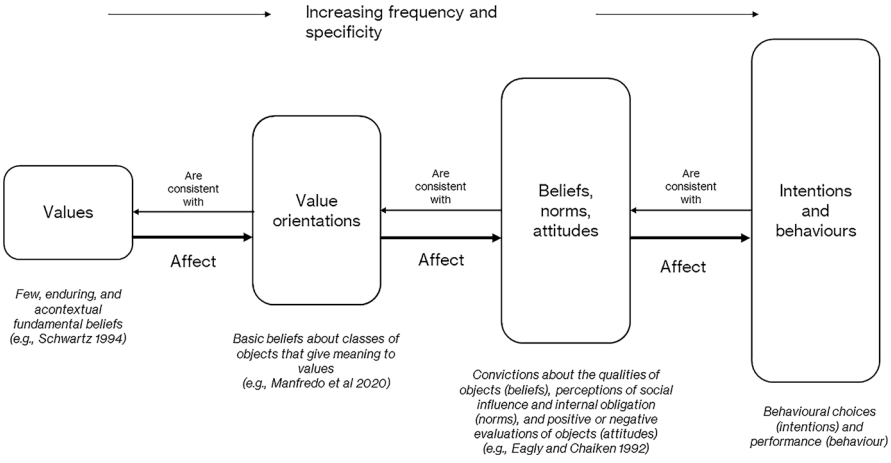

Fig. 2 Cognitive hierarchy theory. (Adapted from Homer and Kahle (1988), Fulton et al. (1996), and Milfont et al. (2010))

literatures, we pause to define them (values, value orientations, beliefs, norms, and attitudes) here, but will return to each in our subsequent description of the conceptual framework and their application to recreational fisher behaviour.

2.1.1 Values

At the foundation of the cognitive hierarchy are values (Fig. 2). Values are trans-situational beliefs about how to live one's life; they are not specific to any domain (e.g., fishing or the environment) and hold generally (Schwartz 1994). Values, in turn, shape individuals' evaluations of the more specific phenomena they encounter in their external environment. Values are few, strongly held, and formed early in life through socialization (Rokeach 1973) and are resistant to change (Manfredo et al. 2017).

Schwartz's refined values theory is perhaps the most comprehensive account of human values. This theory describes values as possessing six basic attributes. They (i) are beliefs tied to affect (e.g., emotion), (ii) refer to desirable goals, (iii) transcend specific actions and situations, (iv) serve as evaluative criteria, (v) are ordered by importance, and (vi) their relative importance drives actions (Schwartz 2012). Schwartz and colleagues hypothesize that there exists a conserved set of values (self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism) from which broader scale patterns of ideology, preference, and culture derive. Variance exists in values between individuals within cultures, and in the dominant patterns found between cultures. Importantly, the relative priorities that individuals place on the values described by the theory influence their general approach to life and affect their behaviour, mediated by the other cognitions in the hierarchy.

2.1.2 Value Orientations

Unlike values that transcend objects and contexts, value orientations are beliefs about broad classes of objects and give meaning to values in a more specific context or domain, such as fisheries or wildlife (Fulton et al. 1996). Some also refer to value orientations as basic beliefs or worldviews, but all serve a similar psychological function. We separate value orientations from beliefs per se and suggest their primacy following application of the cognitive hierarchy, which has centred on value orientations as explanatory of higher-order cognitions like beliefs, norms, and attitudes (Whittaker et al. 2006). Examples of value orientations encountered in the fisheries and wildlife and conservation literatures include wildlife value orientations (Fulton et al. 1996; Manfredo et al. 2020), the new ecological paradigm as a measure of environmental concern (Dunlap et al. 2000), and ecological dominance orientation (Uenal et al. 2022). Value orientations operate like a lens that shapes how individuals see and respond to what they encounter in life as it pertains to certain issues, like one's relationship to the natural environment (Stern et al. 1995).

2.1.3 Beliefs

Beliefs take on many forms, but at their core are convictions that individuals hold to be true about the qualities of objects (Eagly and Chaiken 1993). For example, fishers can hold a functional belief that introducing fish through stocking can benefit and elevate fish stocks (Klefoth et al. 2023). Belief concepts applicable to behavioural prediction as operationalized in social psychological theories include beliefs about one's capacities to undertake behaviours (e.g., self-efficacy and perceived behavioural control), and beliefs about the outcomes of one's behaviour (e.g., behavioural beliefs). However, other beliefs play a prominent role in the broader social psychological literature (e.g., risk perceptions, Siegrist and Árvai 2020). Importantly, the term belief is used by some to describe many differentiated cognitions, including values and value orientations.

2.1.4 Norms

Like beliefs, norms are more specific situational constructs. Social psychologists differentiate between several types of norms, including social norms (descriptive and injunctive) (Cialdini et al. 1990) and personal norms (Schwartz 1977).

Social norms are shared standards of acceptable behaviour that imply an individual's obligation (Vaske et al. 2001; Vaske and Whittaker 2004; Manning 2007). Norms reflect what is considered "normal" in each context and are in part constructed by one's perception of the fit between the self and the context, including the expectations of others. Descriptive norms express an individuals' beliefs about what is "normal to do," or what is commonly done by one's peers, whereas injunctive norms represent what people "should do" (Cialdini et al. 1990; Schroeder et al. 2014). To further emphasize the influence of the individuals' perspective in evaluating standards of behaviour, some social psychological scholars have dubbed social norms "subjective norms" (e.g., Ajzen 1992).

Where social norms refer to shared expectations of behaviour in the social context, personal norms reflect the obligations that one ascribes to oneself to behave in a way consistent with their values (Schwartz 1977; Stern et al. 1999; Stern 2000). Thus, norms contain both elements of the self (personal norms) and the context (social norms) and imply constraint on preference and behaviour.

2.1.5 Attitudes

Though attitudes are commonly invoked in everyday language, the term has a more specific meaning in the academic literature. Social psychologists define an attitude as a tendency to evaluate an object with favour or disfavour (Eagly and Chaiken 1993). Attitudes are conceptualized as having a tripartite structure consisting of cognitive, affective (emotional), and conative (behavioural) dimensions. Typical attitude objects are people, situations, species, or management actions.

2.1.6 Intentions

Finally, intentions are the most proximal antecedent of behaviour in most social psychological theories. Intentions reflect a commitment to undertake a certain behaviour, at a certain time, and in a certain place. Some scholars (e.g., Fishbein and Ajzen 2010) consider intention analogous to a behavioural choice and suggest that an individual forms an intention to undertake a behaviour only after considering its alternatives.

Humans possess an innate need for consistency, and this need is thought to structure relationships among levels of cognitions (Homer and Kahle 1988). Confirmation through behaviour of deeply held cognitions like values results in positive affect (emotion), whereas disconfirmation results in negative affect. Thus, the anticipation of positive affect and avoidance of negative affect directs behaviour, and behaviour is rational. The strength of the hierarchy in directing behaviour depends on the strength of the individuals' commitment to the cognitions via identity and the context in which the behaviour occurs (Heberlein 2012). Formal behavioural theories in social psychology focus on behaviours with distinctive characteristics, and operationalize the constructs reviewed above in separate ways given their foci, but an implicit hypothesis of a hierarchy of cognitions from values to intention exists in most. One example of the application of the cognitive hierarchy in recreational fishing is the study of Riepe and Arlinghaus (2014) who reported that wildlife value orientation shaped specific beliefs about how human should treat animals and beliefs on whether fish and other animals have human-like traits, which in turn affect attitudes to recreational fisheries and the intention to act (e.g., signing a petition to ban fishing). Similarly, Bruskotter and Fulton (2008) explored fishers stewardship norms drawing on the cognitive hierarchy. These authors found that fishers' values orientations affected the appropriateness of technologies for fishing.

Next, we consider two additional theories, the norm activation model and associated value-belief-norm model, and the reasoned action model, and describe the cognitions hypothesized to affect behaviour therein, and their applications to recreational fisheries.

2.2 Norm Activation Model and Value-Belief Norm Model

Schwartz (1977) developed the norm activation model to describe the psychological antecedents of prosociality, or the donation of one's time, money, or physical being in the form of blood or organs. The norm activation model suggests that prosocial behaviours stem from an internalized obligation to act according to one's values. That obligation is known as a personal norm as described above. When a personal norm is activated in a context, it directs behaviour. Personal norms are activated when the individual is aware that their behaviours may impose negative consequences on objects they value, or their behaviours could alleviate negative

consequences imposed by others, and that the individual ascribes some level of responsibility to themselves to act. Those later cognitions (ascription of responsibility and awareness of consequence) are beliefs.

Stern, Dietz, and colleagues (Stern et al. 1999; Stern 2000) extended this model as the value-belief-norm model to understand pro-environmental behaviours. Their extension includes one's environmental worldview (value orientation) and personal values as additional antecedents to an ascription of responsibility and awareness of consequence. Worldviews and values direct selective attention to stimuli pertinent to the self in context. The norm activation model and value-belief-norm model are consistent with a hierarchy of cognitions and suggest that one's internalized moral obligations in the form of personal norms affect behavioural choice.

There are several applications of the norm activation and value-belief-norm models in the recreational fisheries literature. Landon et al. (2018) drew on the norm activation model to explain the stewardship behaviours of fishers in Texas, USA. These authors extended the model to include one's identity as a fisher as an antecedent to personal norms and awareness of consequences. They found support for the norm activation model as an explanation for stewardship behaviours of fishers that were conducted outside the view of others, whereas identity directly predicted more public-facing stewardship activities. Riepe et al. (2021) found support for the value-belief-norm as a model of what compels European residents to engage in fish biodiversity conservation behaviours. Stensland et al. (2013) modelled fishers' intentions to release fish as a function of their personal norms and awareness of consequences derived from the norm activation model, among other constructs. These studies, and others, provide support for an effect of personal norms on the behavioural choice of fishers, and that personal norms are activated via a chain of hierarchical cognitions including beliefs, value orientations, and values.

2.3 Reasoned Action Model

The reasoned action model is perhaps the most applied theory of behaviour from the social psychological tradition in the environmental sciences and beyond (Cooke et al. 2009; St John et al. 2010), including especially the human dimensions literature in fish and wildlife (Miller 2017). Several iterations have existed since its first introduction in the late 1970s (e.g., Fishbein and Ajzen 1975—Theory of Reasoned Action; Ajzen 1992—Theory of Planned Behaviour). We focus on the most contemporary iteration in our discussion, known as the integrated behavioural model or "IM," but use the term reasoned action model to reflect the broader paradigm (e.g., Fishbein and Ajzen 2010). We provide a graphical depiction of the relationships among the constructs that comprise the IM (Fig. 3). The IM suggests that humans' volitional (meaning freely chosen, or not coerced) behaviours are predictable given an underlying set of cognitions including their intent or choice to undertake the behaviour (intention), their attitudes toward the behaviour (attitudes), their perceptions of the behaviours of peers and their expectations (perceived norms), and

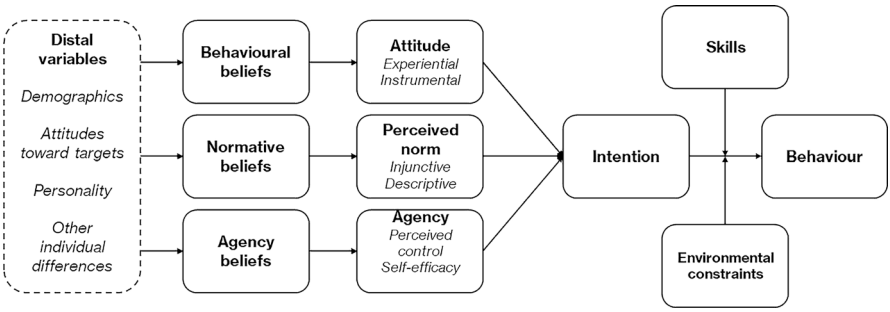

Fig. 3 Integrated model of behavioural prediction. (Adapted from Fishbein and Ajzen (2010))

perception of their ability to undertake the behaviour (self-efficacy). In turn, attitudes are a function of beliefs about the outcomes of the behaviour. Perceived norms, reflecting both a descriptive and injunctive component, are a function of beliefs about others' behaviour, compliance (or non-compliance), and one's motivation to comply. Self-efficacy, including both perceptions of one's control over their behaviour, referred to as perceived behavioural control (PBC), and capacities to undertake the behaviour, stems from associated beliefs. These cognitions are further conditioned on more abstract patterns of individual difference (e.g., personality, values, identities, and habits), sociodemographic variables, and exposure to persuasive communications not directly measured. Proponents of the model further hypothesize that one's skills and the environmental conditions of the context can moderate the relationship between intention and behaviour.

The reasoned action model is centred on attitude theory, specifically that humans' evaluations of, or attitudes about behaviours, depend on higher-order accessible beliefs about those behaviours (Ajzen 2012). The expectancy-value model provides a summation of an attitude based on the strength (unlikely-likely, probable-improbable) and evaluation (good-bad, wise-foolish) of beliefs about the attitude object or behaviour. This is similarly the case for one's normative and self-efficacy beliefs. Thus, the IM is consistent with our proposition that preference is a function of a hierarchy of cognitions and reflected in the behavioural choices of fishers (e.g., intentions), and that the satisfaction of preference is the primary motivator of behaviour conditioned on the context, including one's social relationships, and capacities.

The reasoned action model, predominantly in the form of the Theory of Planned Behaviour (TPB), has seen several applications in recreational fisheries. Crandall et al. (2018) employed the TPB to model how fisher's attitudes and subjective norms correlated with the use of venting tools and descending gear to mitigate barotrauma (i.e., major stressors on fish related to expansion of internal gases due to declining pressure during rapid ascent from depth) on released reef fish in Florida. Whereas attitudes and PBC influenced fishers' intentions to use barotrauma mitigation, subjective norms exerted the strongest influence, highlighting a common finding that norms are particularly behaviourally relevant (Arlinghaus et al. 2022). This,

however, depends on the decision context. In a different study, attitudes and PBC—but not social norms—predicted intentions related to fish stocking among Swiss fishers (von Lindern and Mosler 2014). Actual fish stocking behaviour was predicted by both intentions and PBC, but also by the mental models about the functionality of stocking (von Lindern and Mosler 2014). Riepe et al. (2017) and Fujitani et al. (2020) also found that perceived functionality affected fish stocking decisions by managers, but psychological factors played a much smaller role in the context of decisions about stocking than about habitat management (Fujitani et al. 2020), indicating the context defines the salience of attitudes, norms, and efficacy in determining intention and behaviour.

The social psychological theories describe how an array of underlying cognitions affects fishers' evaluations of fishing opportunity. Those evaluations are manifest in an intention or choice to fish in a certain place, in a certain way, and at a certain time as a function of one's attitude toward that specific behaviour, perceived norms to engaging in that behaviour, and self-efficacy to do so. Attitude, norms, and self-efficacy are conditioned on underlying beliefs, which are in turn a function of more abstract cognitions, including value orientations and values. Each of these theories and their associated constructs featured in research explain the attitudes and behaviours of recreational fishers, as do other concepts like identity, involvement and specialization, place attachment, coping, constraints and negotiation, motivation, and satisfaction. This diversity of topics has led to a fractured literature using different names for the same concepts and adopting different philosophical positions on the causes and consequences of behaviour. We introduce our conceptual framework to attempt to bring a unifying thread to this literature. As we describe our conceptual framework, we continue to introduce the remainder of these concepts and their applications in recreational fisheries research.

3 Conceptual Framework for Understanding Recreational Fisheries from a Psychological Perspective

3.1 Cognitive Antecedents of Preference for Fishing Opportunity

Our framework is centred around a fisher's choice to participate in fishing in a certain place, in a certain way, and at a certain time. In making that choice, fishers must consider the many alternatives they have before them. Which species to target? What tackle to use? What lake or river to fish on and where? Fish at night or during the day? Bring the kids? Fish alone or with friends? Whether a fisher realizes it, they are considering the many alternatives before them when they make a choice to fish. We refer to this process as evaluation of fishing opportunity and suggest that it occurs via the formation of concrete preferences. Preferences refer to the order of importance individuals hold for a set of alternatives before them (Hausman 2005,

2011). For example, a harvest regulation type A might be preferred over a harvest regulation type B or night fishing over day fishing. As mentioned previously, participation in fishing involves numerous choices, and implied in those choices are trade-offs among alternatives with distinctive characteristics. One's inclination toward one alternative fishing opportunity over another, given its characteristics, reflects the immediate influences of preferences and the trade-offs fishers are willing to make before making a decision (Hunt et al. 2019). Elements of the choice context, including time, financial resources, and rules and regulations necessary to carry out a behaviour, limit the alternatives available to individuals despite their preference (Gintis 2007). Accounting for the constraints of the context, fishers exhibit patterns of choice corresponding to attributes of the experience and its setting (Fenichel et al. 2013; Hunt et al. 2019). Thus, on average, fishers make choices about fishing opportunities that satisfy their preferences (Beardmore et al. 2013), provided the options are available (and people are aware of them) and constraints can be negotiated (Stensland et al. 2016; TenHarmsel et al. 2021).

Fishers may exhibit preferences for various elements of the experience, but three categories capture the majority pertinent to understanding their behaviour: activity, species, and site preferences. Activity preferences refer to those preferences for the way one fishes (Sutton and Ditton 2005; Sutton and Oh 2015). At the most fundamental level, it is about choosing fishing versus doing something else with free time (Sutton and Oh 2015). Once a decision on fishing has been made, the process follows to think about the choice of a site, bait (e.g., live bait versus artificial lures), tackle (e.g., spinning versus fly), and within site location (e.g., from shore or a boat), among many others. Species preferences, as the name suggests, reflect preference for the target of the fishing activity. Site preferences include those preferences for the context of the fishing activity, including the number of other fishers (crowding), the expected catch rate at the location, the size of the fish at the location, fishing regulations at the location, and numbers of non-fishing users at the site, among many others. Scholars (e.g., Hunt 2005; Hunt et al. 2019) have examined the role of these attributes, and others, in fishers' choice of fishing location. Preferences for these attributes in many cases cannot be separated from one another, as, for instance, one's choice of tackle may stem from their preferred species, and site preference is conditioned on the presence of that species and quality of its stock. The combination of activity, species, and site preferences captures the trade-offs fishers make in evaluating fishing opportunity.

Yet, the question remains: why do fishers prefer one fishing opportunity over another? The question of where preferences come from remains a steadfast pursuit and source of debate in the literature on economics and social psychology (Sen 1977; Hausman 2011; Engelen 2017). Most scholars accept that preferences relate to individuals' cognitions, including awareness and habit, identities, values, beliefs (including self-efficacy), norms, and attitudes (Gintis 2007). Economists often refer to this diverse set of cognitions collectively as beliefs (Hausman 2011), whereas social psychologists differentiate carefully among them as we have previously described (Homer and Kahle 1988; Stern et al. 1999; Fishbein and Ajzen 2010; Vaske and Manfredo 2012). Where resource economics offers one leading

theoretical framework of choice (utility theory), social psychology offers rich descriptions of the cognitive processes that underpin choice, and the consequences of choice once the behaviour is undertaken. Unlike resource economics, where a single theoretical account dominates most inquiry, social psychological scholarship is fragmented into several traditions despite some unifying assumptions (e.g., the reasoned action model, norm-activation model, the cognitive hierarchy, Klöckner 2013). The different cognitions in these frameworks are similar and related, and our framework attempts to synthesize them. We assume that fishers' preferences are a function of their multiple underlying cognitions, and that cognitions and preferences work together to determine behaviour within the confines of the social, ecological, and institutional context. In the sections to follow, we describe the set of cognitions that underpin fishers' preferences, beginning with the most encompassing, enduring, and abstract (identities and values), and ending with the most specific, dynamic, and fleeting (attitudes). In each section, we introduce the theoretical foundation of the construct and describe its application in recreational fisheries.

3.2 Identity and the Social Context

Fishers, regardless of where they may live, exist in highly differentiated social contexts. Examples of differentiation include gender, occupation, and race, among others. Social psychologists explain the causes and consequences of differentiation through the lens of social identity (Tajfel and Turner 1985; Lalonde 2002). Social identities are those internalized self-meanings that arise through social interaction and link to those roles that individuals occupy in society. Fishers may possess numerous identities (see next subsection on involvement and specialization), each with differing salience, prominence, and commitment in myriad contexts (Stryker and Burke 2000). Identities shape and are shaped by the sets of values, beliefs, norms, and attitudes that describe the dominant pattern exhibited by the archetype representative of that social group (Hogg et al. 2017). Thus, identities possess motivational properties and preferences (Bryan 1977) as individuals seek to think and behave in a manner consistent with expectations of other members of the group, or with meanings ascribed to the self (Stryker and Burke 2000). Identities also exist in a dialectic relationship with the meanings with which they associate and serve to reify between-group differences in exhibited patterns of preference and behaviour. "Recreational fisher," as a social role, is an example of an identity that has implications for the behaviours of individuals that have internalized it (Landon et al. 2018). Within the recreational fishing social world (Ditton et al. 1992), other identities exist, such as specialized and less specialized fishers (Bryan 1977, see next section). Fishers may possess more specific identities beyond general involvement and tied to styles of participation like "fly fisher," "ice fisher," or "saltwater fisher," among many others (Ditton et al. 1992), and each with possible unique constructions across social fields (e.g., the totality of their person-person relationships). Each identity has a bearing on the patterns of values, beliefs, norms, and attitudes internalized by

individuals, their preferences, intentions, and behaviours (Stets and Biga 2003). That is to say that variance in recreational fishers' cognitions and behaviours stems from the consequences of differentiation and can in part account for differences among groups. These processes are depicted at the bottom of the left-hand side of figure (Fig. 1) as the "fisher identity." As noted in the figure, other salient identities can have a bearing on the evaluation of fishing opportunity. In a hypothetical example, one's identification as an environmentalist might influence one's choice of fishing location, given beliefs about the carbon costs of travel to alternative locations.

Research exploring concepts of identity in recreational fisheries falls under two predominant and related traditions: involvement (Havitz and Dimanche 1990; Kyle et al. 2007a) and specialization (Bryan 1977; Ditton et al. 1992; Scott and Shafer 2001; Hunt et al. 2023). It is suggested that these concepts and their associated measures reflect recreational fishers' "personalities" and deeply held cognitions about their relationship to fishing (Ditton et al. 1992; Scott and Shafer 2001; Koemle et al. 2024). Involvement in recreational fisheries is defined as an individual's ". . .unobservable state of motivation, arousal or interest. . ." in the activity (Havitz and Dimanche 1997, p. 246). Specialization as a concept was developed in trout recreational fishing in the USA and was described as a behaviour that moves from the "general to the particular," reflected in preferences, catch attitudes, and behaviours (Bryan 1977). Specialization has three dimensions—behavioural commitment, psychological commitment, and cognition or skill (Scott and Shafer 2001); it captures the diversity of behaviours exhibited toward fishing and their cognitive correlates. Like involvement, specialization is further defined as reflective of one's affective attachment to the activity (Ditton et al. 1992). Importantly, involvement and specialization do not proscribe fishers' means of engagement in fishing but relate to their intensity of engagement, or the importance people ascribe to it. People with varying involvement or specialization systematically vary in norms and attitudes to fishing, management preferences, and behaviours (e.g., Bryan 1977; Chipman and Helfrich 1988; Fisher 1997; Schroeder et al. 2008a, b; Johnston et al. 2010; Hunt et al. 2023; Koemle et al. 2024).

Hunt et al. (2023) argue that the concept of involvement is deeply grounded in attitudinal concepts and hence social psychology, whereas specialization has an origin in qualitative, inductive reasoning in sociology (see Bryan 1977). In measures of specialization, attitudes and behaviours are often mixed, which is conceptually problematic. Although specialization as a way to measure fisher identity and diversity has been around for more than 40 years, there is a large variation in how the concept, or sub-dimensions, have been measured in outdoor recreation studies, including fishing (Scott and Shafer 2001). This is of ongoing concern (Hunt et al. 2023). Though standard scales exist to measure involvement (and sub-dimensions such as attraction and identity, Kyle et al. 2007a), no such standard exists for specialization. The only recommendation is that specialization is a multidimensional construct with three sub-dimensions (behavioural commitment, psychological commitment, and skill). These sub-dimensions exert different relationships on attitudes and management preferences (Slaton et al. 2023). If researchers only measure one or two of the sub-dimensions, the term specialization should not be used, and measures

should be kept separately. Involvement may also be used as a sub-concept of specialization, especially psychological commitment. Some researchers have dubbed the relationship between the self and the activity "ego-involvement" (Selin and Howard 1988); we will use that term in the following text to reflect both traditions but want to highlight that specialization is the prevalent term in recreational fishing literature. In short, both are conceptually a measure of "fisher identity," and empirical studies support that they relate to other concepts, such as beliefs, attitudes, preferences, and behaviour.

Measurement and operationalization of involvement and specialization differ, but some elements are consistent across the literature. Researchers have consistently looked to the centrality of fishing in one's life as an indicator of one's degree of ego-involvement, although centrality is only one component of involvement, which also has measures of identity or attraction (Kyle et al. 2007a). Centrality is, however, an often-used measure of the psychological relevance of fishing in the lifestyle of a fisher. Beardmore et al. (2013) found that centrality influenced fishers' general fishing preferences in Germany. Sutton (2006) provides evidence for centrality as an antecedent to participation in public fisheries consultation meetings by fishers. Van den Heuvel et al. (2022) suggest that centrality, mediated by place attachment, relates to fishers' fishing destination loyalty. Sutton and Ditton (2001) evaluated the effects of centrality on fishers' catch-and-release behaviours in the Atlantic bluefin tuna (*Thunnus thynnus*) fishery. These authors found the likelihood of releasing fish on a 1-day trip increased with increasing centrality. Koemle et al. (2024) found that ego-involvement, operationalized as centrality, influenced the decision rules used by fishers when choosing among alternative regulatory options for northern pike (*Esox lucius*) in Germany. These authors further suggest that one's degree of ego-involvement in the activity influences the availability of some choice alternatives, such that regret minimization rather than utility maximization captures their cognitive process in deciding among them. Schroeder et al. (2018) and Arlinghaus and Mehner (2005) found that measures of ego-involvement predicted fishers' attitudes toward habitat restoration and stocking. Slaton et al. (2023) compared different measures of specialization and found that centrality explained management attitudes related to habitats and harvest regulations, and behavioural commitment was a better predictor of attitudes to commercial fisheries.

Collectively, these studies suggest that the more ego-involved a fisher is in fishing, the more sensitive they are to fishing-related stimuli, the more crystallized their attitudes about fishing, and the more likely they are to engage in behaviours surrounding fishing. This includes acceptance of regulations or aversion to certain fishery management tools such as protected areas (Oh and Ditton 2006; Slaton et al. 2023). Involvement and related concepts such as commitment (Buchanan 1985) or specialization have implications for long-term participation in recreation (Havitz and Howard 1995) and the ability to negotiate constraints (Jun and Kyle 2011; Mueller et al. 2019). We will return to these points in later sections. Ego-involvement in fishing is an important aspect of the cognitions that influence preference, but in and of itself, it does not fully account for the diversity of preferences and behaviours exhibited by fishers. In addition to identity, concrete preferences are reflective of myriad other cognitions that can be correlated to ego-involvement or may also vary

from culture to culture. One must therefore be critical of broad categorization and not conflate identity with specific attitudes and behaviours. For example, highly specialized fishers are often assumed to be less consumptive and engage more in catch-and-release (Bryan 1977), but the very same fishers may be highly consumptive in other cultures (Dorow et al. 2010). Hunt et al. (2023) propose that measures of specialization or involvement must be separated from the traits (e.g., consumptiveness) that fishers may express in a particular context. This position is further supported by social identity theory (Tajfel and Turner 1985) as discussed above.

3.3 Cognitive Antecedents of Preference

We suggest that the cognitive antecedents of preference exist in a hierarchy as we have described above, and that the relationships among the cognitions in that hierarchy are moderated by identity (Kyle and Landon 2023). Though it is beyond the scope of this review to describe every cognition pertinent to fishers' preferences, we endeavour to review the constructs that have featured prominently in the literature. The cognitive hierarchy has become an often-used template for understanding the relationships between cognitions, specifically in fisheries and wildlife (Fulton et al. 1996). However, cognitions at levels of the hierarchy do not fully mediate one another, and some conceptual overlap may exist between definitions of forms of cognitions, especially as they are used in applied fields like recreational fisheries. Here we discuss several forms of cognitions, including values, beliefs (including value orientations, control beliefs, and beliefs about the outcomes of fishing), norms, and attitudes (including place attachment) as they relate to fishers' preferences and behaviour. The cognitions that underpin preference are key attributes of the literature on the human dimensions of recreational fisheries from the social psychological perspective, specifically, beliefs and attitudes stand out as quantified in many studies.

3.3.1 Values

Few studies in recreational fisheries have examined basic values like those reflective of Schwartz's theory, as these values are causally distal from most outcomes of interest to management. However, values have been used to explain the chain of cognitive reasoning as applied to selected constructs (e.g., anti-fishing attitudes, Riepe and Arlinghaus 2014). Despite this paucity of research, it is the variation in basic personal values that manifests in higher-order evaluations of fisheries-relevant attitude objects, such as how fishers or the public position themselves in relation to certain management tools (Riepe et al. 2021), among other topics. For these reasons, we retain values as the foundation of the cognitive antecedents of preference (Fig. 1) but suggest that additional research on personal values could enhance understanding of fisher behaviour. This may be especially true for the diversity of fishers and their identities.

3.3.2 Beliefs

Given the ubiquity of the belief concept in both psychology and economics, numerous conceptualizations exist. Social psychologists, as noted previously, define beliefs as convictions that individuals hold to be true about the qualities of certain objects or domains (Eagly and Chaiken 1993). Importantly, beliefs are also implied in values as mentioned above; here we mean more specific beliefs related to a specific domain (e.g., wildlife or fishing environment). Here we examine three types of beliefs germane to understanding recreational fishers' preferences and behaviours: basic beliefs (i.e., value orientations or worldviews), control beliefs, and beliefs about the outcomes of behaviour.

Value orientations relevant to fisheries management include wildlife value orientations (Fulton et al. 1996) and the new ecological paradigm (Dunlap et al. 2000), but others exist. Wildlife value orientations are basic beliefs about the relationship between humans and wildlife (including fish). Manfredo and colleagues have argued that wildlife value orientations in western societies can be characterized along two broad dimensions, domination and mutualism, with a trend toward increasing mutualism in the twenty-first century in some western countries (Manfredo et al. 2017, 2020). Those with beliefs in line with the domination dimension believe wildlife exists for human use and that consumptive uses of wildlife are appropriate. Those with beliefs reflective of mutualism believe wildlife is a part of a broader community to which humans belong and deserve rights similar to humans (Teel and Manfredo 2010). These value orientations are relevant to recreational fisheries and wildlife management in that they are highly predictive of support or opposition to fishing and hunting, as well as management activities such as lethal control of species and stewardship of resources (Riepe and Arlinghaus 2014). An increasing proportion of Western societies holding a mutualism orientation may also result in declining participation in activities like hunting and fishing, and as such, it is a potentially important element of fishers' cognitions. Wildlife value orientations also structure what actions of fish and wildlife management agencies are deemed acceptable and unacceptable (Whittaker et al. 2006; Jacobs et al. 2014).

Research in recreational fisheries has drawn on the concept of value orientations to explain broad patterns of attitudes and behaviours among fishers (Bruskotter and Fulton 2008; Arlinghaus et al. 2012; Riepe and Arlinghaus 2014; Schroeder et al. 2018). For example, researchers grouped recreational fishers into three value orientations termed utilitarian, dominance, and protection, which they determined from analysing the pattern of belief statements of recreational fishers (Bruskotter and Fulton 2008). The utilitarian value orientation was comprised of beliefs about the appropriate uses of fisheries resources and their utility to human beings (e.g., fish are valuable only if people get to use them in some way). Individuals with utilitarian orientations believed that fisheries should be used in a way that maximizes their utility to people. In this study, Minnesota, USA fishers displayed low levels of utilitarianism. The dominance value orientation focused on the rights and importance of human beings versus those of non-human organisms (e.g., fish have as much

right to exist as people [reverse coded]; humans have a right to change the natural world to suit their needs). Individuals who hold dominance orientations believe in human mastery over the natural world, and they hold that humans have the "right" to modify fisheries and other resources to accommodate human wants and needs. Dominance orientations were less prominent among Minnesota, USA fishers than utilitarian orientations. The protection value orientation dealt with prioritizing environmental protections over peoples' wants (e.g., protecting the environment is more important than providing fishing opportunities.) Minnesota, USA fishers displayed a strong protection orientation. Using the measurement approach from Bruskotter and Fulton (2008) to define relevant value orientations, Schroeder et al. (2018) examined trade-offs for funding fish stocking versus habitat management. They found that protection value orientations predicted decreased allocation of funds for fish stocking, and that stronger utilitarian values predicted increased allocation of funds for stocking. The intensity of value orientations among the constituency of a fisheries management institution can explain priorities for alternative approaches to management, like stocking versus ecological restoration. Understanding values and value orientations has utility in predicting beliefs, norms, attitudes, and behaviours.

Wildlife value orientation is just one type of value orientation. In the environmental psychological sciences, other constructs have been developed, such as the New Ecological Paradigm (Dunlap et al. 2000), to measure humans' beliefs about their relationship to the environment broadly and applied in the recreational fisheries context (Mackay et al. 2020). The compendium associated with chapter "Measurement Instruments" by Kyle et al. (2026) summarizes key constructs, which have been applied in recreational fishing studies in the past (e.g., Riepe and Arlinghaus 2014; Riepe et al. 2021).

3.3.3 Control Beliefs

Fishers possess beliefs about their ability to undertake fisheries-related behaviours in certain places and at certain times. The reasoned action model, as reviewed previously, suggests that fishers' intentions and behaviours stem in part from their beliefs about their capacities to undertake those behaviours. Other theories, like Bandura's (1977) self-efficacy theory of motivation, suggest self-efficacy is the primary motivator of behaviour and arises from experience. Individuals form expectations about the outcomes of their behaviour by modelling observations of others and from their own past behaviours (Bandura 1997). Control beliefs play a role in shaping individuals' preferences and evaluations of recreation opportunity and the ability to participate (Smith et al. 2022). Thus, we suggest that control beliefs (self-efficacy and perceived behavioural control) are an important part of the cognitions that affect fishers' preferences. Fishers may, for instance, evaluate fishing opportunity based on their perceptions of efficacy. Hypothetically, one's beliefs about their abilities to paddle a river safely and effectively, or traverse open water in a boat, or climb to a river fishing site, could all influence preference for fishing sites, tackles, and species.

3.3.4 Beliefs About the Outcomes of Fishing

Fishers hold beliefs about specific objects in time and space, with implications for their evaluations of fishing opportunity. Fishers may also have beliefs about the benefits that fishing will bring to them and act upon that expectation. Outcome beliefs are also important in terms of beliefs that fishers' hold regarding the expected outcomes of fishing experience or of certain actions (e.g., belief that released fish survive; Stensland et al. 2013). At the most fundamental level, leisure researchers have dubbed outcome beliefs as recreation experience preferences or motives (Driver and Tocher 1970; Driver and Brown 1975; Driver and Cooksey 1980; Manfredo et al. 1996), and the concept has seen widespread use in research on recreational fisheries to help explain why fishers participate in fishing and what psychological benefits they seek (Fedler and Ditton 1994). Scholars and practitioners have conflated experience preferences with motivation per se and the recreational fisheries sector is not immune. Rooted in the benefits to leisure paradigm (Hendee 1974; Driver 1985), measures of recreation experience preference capture those elements of recreation experience that fishers find important, and thus seek to obtain from the experience. Under this conceptualization, the expectation of obtaining preferred benefits (e.g., achievement, self-determination, escape) motivates behaviour. Scholars have subsequently dubbed these beliefs motives or motivations. We contend that although recreation experience preferences reflect convictions that fishers hold to be true about the qualities of the experiences they endeavour to engage in (e.g., beliefs), and are therefore reasons for engagement (Hausman 2011), motivation stems from the pursuit of those goals via the satisfaction of preference. Therefore, recreation experience preferences are one set of the many cognitions that may shape fishers' preferences with implications for the evaluation of fishing opportunity. Importantly, however, beliefs about the expected outcomes of experiences serve a role in individuals' evaluations of the quality of those experiences post hoc but may not relate strongly to their behavioural choices (Schramm et al. 2003). We will elaborate on this point further in the section to follow and return to it in our discussion of satisfaction under hedonic well-being and the outcomes of behaviour. Despite our qualification regarding the conceptualization of recreation experience preferences in the existing literature, and to remain consistent with that literature, we will use the term motivations to reference the construct in the remainder of our discussion in this section.

As early as the 1960s, researchers explored why people participate in fishing and found multiple motivations for their trips (Bultena and Taves 1961). In the 1970s, Driver and colleagues began building a conceptual framework for studying motivations and benefits associated with outdoor recreation (Driver and Tocher 1970; Driver and Brown 1975; Driver 1976; Driver and Brown 1978), following a multiple benefits approach to recreation (Hendee 1974; Driver 1985). This research was instrumental in measuring (Manfredo et al. 1996) and identifying the motivations and outcomes that encourage fishing participation very generally (Knopf et al. 1973; Bryan 1974; Driver and Knopf 1976; Fedler and Ditton 1994; Ditton 2004; Beardmore et al. 2011).

Fedler and Ditton (1994) summarized motivations for fishing from US studies available at the time to include: (i) general psychological and physiological, (ii) natural environment, (iii) social, (iv) fisheries resource, and (v) skill and equipment. It is worth noting that the evolving application of the recreation experience preference measures to recreational fisheries (e.g., Fedler and Ditton 1994; Beardmore et al. 2011) deviates from the original intent and item lists of its authors, specifically by the addition of catch-related motives. However, in the original conceptualization by Driver and colleagues, which was general to outdoor recreation, catching fish was not present in any of the items used to measure motives. This is because Driver and colleagues' original work emphasized fundamental benefits of leisure that transcend outdoor activities. The addition of fisheries-specific measures ("to catch fish") occurred later, specifically in recreational fishing studies (Fedler and Ditton 1994) and without the theoretical foundation of the original work. Catching fish is perhaps not an instrumental motive per se, but it serves to contribute to other expected benefits that are more generally salient (e.g., achievement). Being aware of this conceptual departure, item lists to measure fishing motives now commonly include so-called activity specific (related to catch or consumption of fish) and activity general measures that are unrelated to catch (Fisher 1997; Arlinghaus 2006; Beardmore et al. 2011; see compendium associated with chapter "Measurement Instruments" for more detail on measurement). However, the relevance of catch can perhaps be better assessed not by a motivational, but by an attitudinal concept, which is catch orientation (Anderson et al. 2007, see below for details).

Motivations, or expected benefits, for recreational fishing differ by fishers engaged in different settings such as stream, bank, lake, freshwater, saltwater, wild vs. put and take (Fedler and Ditton 1994; Manning 2022), demographic background such as gender, race (Schroeder et al. 2006; Toth Jr and Brown 1997; Witter et al. 1982), and other contextual and situational elements of the activity including duration, number, and characteristics of other trip participants, and regulations governing the harvest at the site for that species and season. Motivations also vary by fisher "personality" or identity as elaborated above, such as level of specialization and involvement (Ditton et al. 1992; Beardmore et al. 2011). Similarly, the orientation to catch varies strongly with different settings, fisher types, and identities (Dorow et al. 2010).

Findings that show catching fish is not an important motive for fishing should not be misinterpreted to mean that catch is unimportant to fishers, quite the opposite is true (Arlinghaus 2006; Beardmore et al. 2011). Motivations should not be confused with satisfactions because they hold more predictive power to explain general behaviours (e.g., which type of fishing to engage in or whether to fish) than specific behaviours or attitudes (Arlinghaus 2006). Many early studies of recreational fishers' motivations emphasized activity-general recreation motivations (e.g., enjoying nature, spending time with family and friends) over activity-specific motivations related to catching fish or the challenge of catching fish (Fedler and Ditton 1994). When motives are assessed at a general level, it is a recurring finding that activity-general motives associated with recreation are generally more important to fishers than specific motives related to catch or consumption (Ditton 2004). This must not

be misinterpreted as if catch is not important because activity-general components of fishing are more easily satisfied than catch expectations (Birdsong et al. 2021). The relevance of catch to fishers is not well revealed by classical motivation research as commonly operationalized in the literature (e.g., the item list by Fedler and Ditton (1994)). Instead, assessing attitudes to catch, known as consumptive or catch orientation (Anderson et al. 2007), has been found to better represent the importance of catch to fishers and better explain behaviour (Schramm et al. 2003). This is an attitudinal concept, not an outcome belief. We will return to this important concept under the section on attitudes. However, beliefs about the outcomes of behaviour as operationalized by the recreation experience preference scales may shape fishers' general preferences for fishing opportunity.

3.3.5 Norms

The norm activation and value-belief-norm models and the reasoned action model suggest there are normative influences on preference and behaviour. Studies reviewed previously suggest that these constructs (i.e., personal norms, injunctive and descriptive social norms) play a role in fishers' behavioural choices. We refer to these in figure (Fig. 1) collectively as norms. Norms link preference to the social context (Kimbrough and Vostroknutov 2016) and to individuals' deeply held convictions like values (Schwartz 1977) and limit the availability of some behavioural alternatives (Hausman 2011). Norms, therefore, comprise an element of fishers' cognitions pertinent to their preferences for fishing opportunity. Norms also make choices boundedly rational, as the mechanisms that link norms and behaviour include the minimization of negative affect (Schwartz 1977). Thus, without norms, fishers may form different concrete preferences and make different choices (Mackay et al. 2020). As reviewed previously, research from Riepe et al. (2017) and Landon et al. (2018) highlights the importance of norms in the cognitions and behaviours of managers and fishers, respectively. Stensland et al. (2013) provide further evidence for the role of norms in shaping fisher behaviour. These authors describe the perceived social pressures that fishers feel to participate in catch-and-release behaviour. Thus, norms are an important antecedent to fishers' preferences.

3.3.6 Attitudes

Recreational fishers' attitudes are frequently studied, both as independent (predictor of some other construct) or as dependent variables (aspects to be explained), and examples are numerous (e.g., Chipman and Helfrich 1988; Arlinghaus and Mehner 2005; Slaton et al. 2023). For instance, a manager might wish to stock fish in a waterbody they manage and, before doing so, would like to know the level of support or opposition to stocking those fish among a population of fishers that use the resource (Arlinghaus et al. 2014). Fishers' support or opposition for stocking is an example of an attitude; a positive or negative evaluation (support, opposition) of

an object (stocking). Those same fishers might possess numerous beliefs (e.g., stocking usually works, or stocking is a harm to local genetic strains) about stocking that inform and co-affect their attitude. A belief that stocked fish are inferior to naturally produced fish might lead a fisher to oppose stocking, whereas a belief that the stock in that waterbody is low and that stocking helps might lead a fisher to support stocking (von Lindern and Mosler 2014). Other recreational fisheries studies have gauged attitudes and beliefs about many different regulations, including creel and size limits, protected seasons, catch-and-release regulations, and catch-reporting programs (e.g., Hicks et al. 1983; Midway et al. 2020; van den Heuvel et al. 2020; Slaton et al. 2023). Attitudes are critical outcome variables in policy research on recreational fisheries. Many regulatory schemes require consulting populations of stakeholders to assess their preferences or attitudes before implementing change in accordance with best governance practice (Decker et al. 2016). Critically, fishers' beliefs about fisheries resources, and their attitudes toward elements of those resources are situated in a hierarchy of cognitions, and may influence behaviours such as voting behaviours, illegal releases of fishes, or in voicing of complaints to new policies (Hunt et al. 2010; von Lindern and Mosler 2014; Arlinghaus et al. 2022). Although attitudes can be considered an intermediate construct that explains behaviours of fishers, in practical applications attitude is perhaps the most often studied concept when used as the dependent variable (i.e., as an end in itself) by helping to understand the variation of attitudes to salient topics (such as management measures) in populations of fishers. We note that attitudes are, however, also a predictor of behaviour, but that behaviour is affected by many more aspects, including values, beliefs, and norms. Nevertheless, attitudes by themselves are highly relevant concepts to understand from a management perspective, precisely because they tie to concepts of acceptability and because they are antecedents of behaviour (Heberlein 2012).

3.3.7 Catch Orientation as an Attitude

Fishers have a tendency to evaluate certain classes of attitude objects positively or negatively as a function of the underlying constructs previously reviewed. Fishers' evaluation of the catch and retention aspects of fishing, known as consumptive orientation or catch orientation, is an important and commonly studied attitude in recreational fisheries research (Anderson et al. 2007; Aas and Vitterso 2000). Whereas some have conceptualized the importance of catch as a catch motivation in the recreation experience preference tradition as discussed previously, we agree with Anderson et al. (2007) that catch orientation is an attitudinal construct, and a quite specific one. By contrast, motives are general tendencies to act in a given outdoor situation or when viewed as expected benefits, general expected psychological benefits (i.e., beliefs).

Graefe (1980) was the first to introduce a scale designed to measure fisher catch orientation along four subdimensions of catch something, catching numbers, catching trophy fish, and keeping (or releasing) fish (Anderson et al. 2007; Hutt and

Jackson 2008; Schroeder and Fulton 2013). A growing body of evidence supports the validity and reliability of these dimensions of catch orientation, but item wording and item lists have changed over time (Aas and Vitterso 2000; Sutton and Ditton 2001; Anderson et al. 2007; Kyle et al. 2007b, 2026). Studies have demonstrated the importance of catch-related attitudes to fishers' satisfaction (Graefe and Fedler 1986; Fedler and Ditton 1994; Finn and Loomis 2001; Beardmore et al. 2011) catch and release versus consumption behaviour (Sutton and Ditton 2001; Sutton 2003), and in fishers' preferences for management (Arlinghaus and Mehner 2005; Carlin et al. 2012).

Catch orientation is not only a relevant concept as a predictor of other variables (e.g., support for management, Slaton et al. 2023), but has utility as a tool of market segmentation. Kyle et al. (2007b) used catch orientation to group fishers at a South Carolina recreational sport fishery into market segments. They found that fishers who were least concerned with catching fish expressed the strongest social motivations and place attachment to the lake system being studied, whereas fishers who were most concerned with catching large fish were least motivated by non-angling factors (i.e., escape, social) and had comparatively low attachment to the lake system. The fishers who were least concerned with catching and consuming fish scored low on measures of motivation but expressed the strongest satisfaction and likelihood of returning to the fishery (Kyle et al. 2007b). Using samples of walleye (*Sander vitreus),* northern pike, largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*) fishers, Schroeder and Fulton (2013) examined how catch orientation related to management preferences for these species. Results suggested that the orientation to keep fish related to reduced support for harvest slot limits or restrictive creel limits, whereas an orientation to catch big fish predicted increased support for slot limits or more restrictive creel limits for certain species. They emphasized that examining how catch orientation relates to management preference in specific fisher groups could enable managers to provide desirable fishing opportunities that satisfy and retain fishers. By knowing the correlates of managerial concerns (e.g., attitudes to regulations) with catch orientation, applicants can do rapid assessments of the variation and types of catch orientations in a local fishery using just an abbreviated item list and use this information to "foresee" how the population of fishers thinks and feels about tangible issues such as dropping catch rates or proposed restrictions on harvest, among others. Although the same value might lie in an original motivation assessment using items summarized by Manfredo et al. (1996) and more specifically Fedler and Ditton (1994), we believe the catch orientation construct may hold greater promise for recreational fishing studies than the original experience preference scales (Manfredo et al. 1996). This is particularly so if the investigator wants to predict responses to specific actions, which specific constructs (such as catch orientation) are better at explaining than general constructs (such as motives). The original experience preference scale, instead, is perhaps best suited to compare different recreationists and their expected benefits rather than guiding management responses in fishing specifically. Clearly, more research on fishing motives using alternative conceptualizations is necessary.

3.3.8 Attachment to Setting (Place) as an Attitudinal Construct

Through sustained interaction, humans tend to develop connections to the physical environments around them. Scholars refer to this connection as place attachment. Where involvement and specialization reflect ego-involvement in fishing, place attachment reflects ego-involvement in its setting, which is often conceptualized as an evaluation of place (i.e., an attitude to place). Several conceptualizations of place attachment exist in the literature (Hidalgo and Hernandez 2001). We limit our review to the dominant tradition used in quantitative studies of outdoor recreation, including fishing (Kyle et al. 2005). In this tradition, place attachment is defined as the cognitive and affective bonds between people and the physical environment, especially as applied to settings of outdoor recreation like fishing. Scholars conceptualize place attachment as an attitude possessing cognitive, emotional, and behavioural dimensions (Jorgensen and Stedman 2000). Kyle et al. (2005) conceptualize aspects of one's attachment to place using four dimensions, including place identity, affective attachment, place dependence, and social bonding. Place identity refers to one's incorporation of the physical setting into their sense of self (Prohansky 1978). Affective attachment includes those emotions elicited by the setting. Place dependence refers to one's reliance on the setting to provide for recreational opportunities, and social bonding refers to a setting's ability to afford interactions with people important in one's life.

Few studies have investigated the relationship between place attachment and fishers' preferences and behaviours, but place attachment has the potential to influence their evaluations of fishing opportunity as the activity occurs in settings with which fishers have varying degrees of connection. van den Heuvel and Rönnbäck (2023) found that fishing tourists exhibit higher attachment to fishing tourism sites and have higher loyalty to those destinations. Koemle et al. (2024) did not find evidence for a relationship between place attachment and fishers' preferences for northern pike management in Germany in a choice model. Similarly, Hunt (2008) found a tenuous link between place attachment and fishers' site choice behaviour. Slaton et al. (2023) determined that some measures of place attachment affected attitudes to spatial and other types of management in a sample of German pike fishers. More research is needed to fully explicate the relevance of place to fishers' evaluation of fishing opportunity as the construct has been shown to have effects on the cognitions and behaviours of recreationists in other contexts. For instance, previous research based on Sherif and Hovland's (1961) social judgment theory concluded the more strongly an individual is attached to a setting, the more sensitive they are to conditions they encounter in that setting, including the density of other recreationists (Kyle and Landon 2021) and other environmental conditions (Kyle et al. 2004b). This sensitivity also relates to preferences for management (Kyle et al. 2004a, b), and propensity to undertake behaviours to protect that place (Devine-Wright 2009; Halpenny 2010). We will return to these points in the discussion of fishers' negotiation of conditions encountered in the field.

In summary, research on the social psychology of recreational fisheries suggests that fishers' evaluations of opportunity are a function of their preferences, especially species, site, and activity preferences. These more specific preferences emerge from myriad underlying cognitive antecedents that exist in a hierarchy from specific to general levels that contain few abstract, yet enduring values and many more concrete and dynamic beliefs (including motives), norms, and attitudes (including catch orientation and place attachment). Those cognitions shape and are shaped by social identities embedded in a broader context of one's relationships to other humans. Recreational fishers' degree of ego-involvement in fishing, a psychological measure of fisher personality and engagement with fishing, and the setting of the activity have implications for their fisheries-related cognitions and evaluations of fishing opportunity. These processes are depicted on the left-hand side of figure (Fig. 1).

3.4 The Relationship Between Preference, Intention, and Behaviour, Including Constraints

Preferences, as we defined previously, are total subjective evaluations of the available alternatives (Hausman 2011). Fishers' preferences for fishing opportunity are a function of the cognitions reviewed above, among others that may be relevant to the individual. From among those behavioural alternatives available to fishers, they will choose ones near the top of their preference hierarchy. Their behavioural choices are boundedly rational as they choose alternatives that satisfy their preferences. We contend that the process of behavioural choice is analogous to the development of an intention to fish in a certain place, at a certain time, and in a certain manner. This process is depicted at the top of figure (Fig. 1) where preference → intention.

Following the development of an intention, fishers must follow through on their behaviour, and several factors can impede their intention. Thus, the intention → behaviour relationship is not a given. First, intentions vary in strength, in part conditioned on fishers' ego-involvement. The stronger one's commitment to the identity, the greater their motivation to perform behaviours that verify that identity (Burke 1991). This has implications for the negotiation of constraints to participation, and we will return to this in a section to follow. As we have alluded, a fishers' context has bearing on both their cognitions and behaviours. The hierarchical model of leisure constraints (Crawford et al. 1991) is one conceptualization of the role of the context in the processes that underpin fishers' preferences, and on the relationship between intention and behaviour. Though research to date has not conceptualized leisure constraints in a model of this nature, we believe the implications are clear and relate to the proposition within the IM that environmental conditions moderate the intention-behaviour relationship. Given the role of self-efficacy in determining intention and behaviour, there are also clear links between elements of constraints on cognitions.

Research has classified leisure constraints as: intrapersonal, interpersonal, and structural (Crawford and Godbey 1987; Crawford et al. 1991). Intrapersonal constraints involve the individual's internal psychological processes that affect preferences toward activities (e.g., perception of skill or appropriateness of the activity). Interpersonal constraints relate to other people (e.g., not having a social group with whom to participate, or their approval). Structural constraints involve elements of the context of the activity itself. We differentiate these dimensions of constraints as having different effects on the psycho-behavioural process of fishing participation. Given that constraints are beliefs about one's capacities, the social environment, and the context, they have the potential to effect one's evaluations of fishing opportunity via preference. Constraints may manifest in fishers' attitudes toward, perceived norms about, and perceptions of efficacy related to undertaking a particular fishing behaviour, at a particular place, and at a particular time, and ultimately one's intent to do so. Constraints may also influence the process of engagement once a choice has been made to do so. This is especially the case for structural constraints relating to the context of behaviour.

Several studies have examined constraints on recreational fishing participation (Ritter et al. 1992; Aas 1995; Fedler and Ditton 2001; Schroeder et al. 2008a, b; Freudenberg and Arlinghaus 2009). Consistent with other research, Aas (1995) found that interested fishers reported higher levels of constraints to fishing compared to less-interested fishers and non-fishers, and that different constraints inhibit participants versus nonparticipants (Sutton 2007). Sutton (2007) found that a large majority of Queensland, Australia fishers reported constraints to fishing participation. Schroeder et al. (2008a, b) found that people of colour faced unique constraints to their fishing participation, including selective law enforcement, discriminatory behaviour, safety concerns related to lack of swimming ability, and language barriers. Across studies, structural factors appear to be the constraints fishers perceived most strongly to inhibit fishing participation (Ritter et al. 1992; Aas 1995; Fedler and Ditton 2001; Sutton 2007; Schroeder et al. 2008a, b; Freudenberg and Arlinghaus 2009).

3.5 Coping and Conditions Encountered in the Field

Once fishers have made choices about where, when, how, and with whom to fish, and attempt to do so, they are faced with the realities of the conditions they encounter in the field. These conditions may or may not correspond to their expectations for the experience and elicit cognitive and behavioural reactions with potential implications for well-being. These processes are depicted on the right-hand side of figure (Fig. 1) and include fishers' appraisal of the social, environmental, and managerial conditions, and the cognitive and behavioural coping strategies employed to maintain the well-being fishers derive from the experience.

Lazarus and Folkman's (1984) stress coping model has been applied widely in the leisure sciences to explain the coping mechanisms of recreationists (Schneider and

Hammitt 1995), including fishers (Schroeder and Fulton 2010). The model suggests that the coping process begins with an appraisal of conditions in the field. One's propensity to interpret conditions as a threat to preferred outcomes is a function of their underlying values, beliefs, norms, and attitudes, and ego-involvement in the setting and activity (Kyle et al. 2004a, b). This process is depicted along the bottom of figure (Fig. 1). If fishers appraise setting conditions negatively, they can employ strategies to maintain participation and enjoyment.

Miller and McCool (2003) describe seven forms of coping employed by recreationists under two broad categories: cognitive and behavioural. Behavioural coping, as the name suggests, refers to changes in behaviour made by recreationists in the face of negatively appraised encountered conditions. Examples of behavioural coping include changing the location or time that one fishes (temporal substitution), changing the waterbody one fishes (resource substitution), choosing to fish in a different way (activity substitution), choosing not to fish at all (absolute displacement), or seeking out authorities to make changes to the negatively appraised condition (direct action). There are two main forms of cognitive coping. The first is known as product shift, and references recreationists' change in their expectations from the activity. For example, a fisher encountering more other fishers in the field than they expected, may reevaluate their expectations from the experience. An unsuccessful fisher may also downrate expected catch rates in the future (Birdsong et al. 2021, 2022). This cognitive coping process allows the participant to maintain enjoyment and satisfies needs for competence following one's choice to partake in the behaviour. The second type of cognitive coping is known as rationalization and references the participant's reappraisal of the encountered condition. A fisher may, for instance, rationalize encountering a higher-than-expected number of other fishers by viewing it as a challenge, or by blaming an authority for failing to manage fisher numbers, among others. Both forms of cognitive coping allow the fisher to navigate stress, maintain competence, and continue participation.

3.6 Outcomes of the Fishing Experience

Ultimately, fishing will result in a flow of benefits to participants. Social psychologists, among others, refer to the benefits obtained from life experience as well-being and may use proxies for their measurement, such as satisfaction (Manning 2022). Following (Ryff 1989) and Ryan and Deci (2001), we consider two predominant forms of well-being experienced by fishers: hedonia (hedonic well-being) and eudaimonia (eudaimonic well-being). We also note that fishing generates flows of material benefits, including fish retained for consumption and physiological changes to the body that occur through nature exposure (Kaplan 1995; Ulrich 1983), but because our focus is on the (rational) social psychology of fishing experience, we do not discuss them further. These benefits are depicted in the centre of figure (Fig. 1), between behaviour and associated coping of conditions encountered in the field and the cognitive antecedents of preference. The benefits obtained from participation are partly dependent on and may affect the cognitive antecedents of preference.

3.6.1 Hedonic Well-Being

Hedonic well-being, in relation to recreational fisheries, includes those positive emotional outcomes of participation. Thus, hedonic well-being is synonymous with economic notions of utility (Kahneman et al. 1999). Among the concepts most strongly associated with hedonic well-being is satisfaction. Satisfaction is a measure of the psychological quality of fishing experiences, and cultivating satisfactory experiences is a major stated goal for managers (Birdsong et al. 2021). For example, the Kansas Department of Wildlife and Parks reports fisher satisfaction garnered through creel surveys to state legislators as a performance measure of its fisheries division (S. Steffen, personal communication).

It is hypothesized that hedonic well-being, in the form of satisfaction, arises through the confirmation of expectations for recreational experiences, which are a function of the expected psychological benefits in relation to the actual fishing outcomes (Arlinghaus 2006). Factors that may affect fisher satisfaction include all key aspects that are expected benefits of fishing, including physical (e.g., location, site characteristics and amenities), social (e.g., social group, crowding), managerial (e.g., management objectives, regulations) and ecological attributes (e.g., species richness and diversity, forage and prey dynamics, turbidity). Yet, abundant research underscores the clear importance of catch, access, crowding, and cost to fisher satisfaction (Arlinghaus 2006; Birdsong et al. 2021, 2022; Gundelund et al. 2022). Clearly, how experiences are judged depends on the fisher type (Beardmore et al. 2015). For example, centrality-to-lifestyle, which reflects one's meaningful bond to fishing, influences satisfaction (Beardmore et al. 2015; van den Heuvel et al. 2022). Consistent with theoretical expectations about the relationship between motivations and satisfaction, catch provides greater benefit to fishers with stronger activity-specific motivations compared to those with more activity-general motivations (Gundelund et al. 2022). Satisfaction ultimately derives from expectations in light of experiences, which evolve from motivations, fisher type (e.g., level of centrality), context, and management actions (Gale 1987; Spencer and Spangler 1992; Arlinghaus 2004; van Poorten et al. 2011; Birdsong et al. 2021, 2022; Gundelund et al. 2022). Satisfactory experiences occur when expectations are fulfilled or exceeded (Tang 2014). Fishers' satisfaction with the number of fish caught predicts management preferences, in particular stocking (Arlinghaus and Mehner 2005), so efforts to encourage reasonable fisher expectations and maximize opportunities to catch fish may increase satisfaction (Schroeder et al. 2018).

Whereas research demonstrates a relationship between catch and key non-catch issues (e.g., access and cost) and satisfaction, the relationship is not explicitly linear and varies according to elements of the catch. Birdsong et al. (2022) found that German recreational fishers exhibited diminishing marginal utility for increasing numbers of fish caught, but that the fish size—utility relationship was exponential and positive. Stated another way, fishers derived less utility for each additional fish they caught, but the larger the fish they caught, the more they were satisfied. Managing for fisher satisfaction is thus a difficult prospect, but these findings have

some important implications. It is possible, for instance, to identify catch rates that meet a satisfaction threshold beyond which there is diminishing marginal utility for fishers. Managing for larger fish also has the potential to generate positive welfare outcomes, given the positive and exponential relationship described by Birdsong et al. (2022) and Beardmore et al. (2015). However, ecologically driven trade-offs in management strategies may exist for catch rates and age and size structure of the fishery (Ahrens et al. 2020), and especially given the ecological context. These findings also require confirmation in different social-ecological contexts, but the approach offers promise in how fisheries managers can operationalize satisfaction as an outcome of fisheries management and relate it to strategies.

These propositions are depicted under the box labelled hedonic well-being in the centre of figure (Fig. 1). Fishers possess beliefs about the expected outcomes of the fishing experience as a function of their values, beliefs, norms, and involvement in fishing. These cognitions shape fishers' evaluations of fishing opportunity via preferences and past expectations. Once a fisher has followed through on their intention to participate in a fishing opportunity, and they have negotiated the conditions in the field, they re-appraise the actual experience given their expectations. The confirmation of expectations yields positive affect, often measured as satisfaction (but other measures could apply), the disconfirmation of expectations thwarts the experience of positive affect, often measured as dissatisfaction.

3.6.2 Eudaimonic Well-Being

Well-being in humans is multifaceted, and not all facets of well-being are adequately captured by the positive affective state characteristic of hedonia (Ryff 1989; Ryan and Deci 2001). Eudaimonic well-being refers to those elements of experience that support individuals' growth, development, and realization of their true self (Ryan and Deci 2001; Huta and Ryan 2010). Eudaimonic well-being has implications for understanding motivation and engagement, particularly in recreation (which does not involve meeting essential physiological needs), and the reasons for participation in fisheries beyond expected utility as operationalized in contemporary treatments of satisfaction (Smith et al. 2024). One of the predominant frameworks for the operationalization of aspects of Eudaimonic well-being is that of self-determination theory (Ryan and Deci 2001).

Self-determination theory suggests that humans have an innate tendency toward growth and development (Ryan and Deci 2000). Scholarship in self-determination theory further suggests that it is in the satisfaction of basic psychological needs for autonomy, competence, and relatedness that humans experience higher forms of motivation, including intrinsic motivation, that support growth, development, and optimal psychological function (Ryan 1995). Recreation is a particularly relevant playing field to sensing such "non-essential," yet highly relevant outcomes. In fact, contemporary definitions of leisure include the expression of autonomy as a constituent part (Walker et al. 2019). Contexts that support the satisfaction of "higher order" needs are more likely to foster higher forms of motivation. Research in leisure

contexts further suggests that experiencing the satisfaction of psychological needs in a setting or while participating in a leisure activity can foster attachment to that setting (Landon et al. 2020), or identification as an activity participant (Smith et al. 2023). These observations have implications for the cognitive antecedents of preference as we have depicted (Fig. 1). Whereas fishing may generate emotional happiness and other rewards (e.g., fish for dinner) for participants, it may also support their development as agentic human beings and give meaning to their life including in how they define and see themselves (Smith et al. 2023). In fact, we position that these self-reflective outcomes may be of higher importance and better explain why fishing is so attractive and results in people investing tremendously more time and money than any catch would generate in the commercial market if sold. The reason must lie in the self-determination properties of fishing, a concept economists measure under net willingness-to-pay, i.e., benefits beyond those that cost money to fishers (e.g., licenses or costs).

Eudaimonic well-being is an emerging area of scholarship in recreational fisheries, but it is not without precedent. For instance, many measures of experience preferences used in recreational fisheries studies reflect aspects of basic psychological needs, including spending time with family and friends (relatedness) and experiencing challenge and achievement (competence). Importantly, these elements of the experience are often rated highly by participants, but do not correlate strongly with satisfaction as mentioned previously (Arlinghaus 2006). More work is needed to understand how fishing participation may support eudaimonic well-being, the relationship between hedonic and eudaimonic well-being, and the dynamic relationship between experience and fishers' psychological involvement with the activity. Given the importance of involvement to the evaluation of fishing opportunity, appraisal of environmental conditions, and expenditure of negotiation effort, further research on the factors that support the development of involvement is warranted.

4 A Summary View of Our Integrated Framework

In this chapter, we reviewed the social psychological approach to understanding fisher behaviour. We presented a new integrated conceptual framework of the fishing experience. In this model, we suggested that fishers' evaluations of fishing opportunity reflect their preferences, and that those preferences are a function of their underlying cognitions, including identification and involvement as a fisher, and their values, beliefs, norms, and attitudes toward the activity and the setting where it occurs. Fishers develop intentions to undertake specific behaviours following their attitudes toward the outcomes of those behaviours, perceptions of norms surrounding those behaviours, and self-efficacy. Intention is the most proximate antecedent of behaviour. Fishers face constraints to participation even after they have decided to participate, and those constraints can be negotiated using coping strategies, and as a function of their ego-involvement in fishing. Participation in fishing can yield hedonic, eudaimonic, and material well-being. Hedonic well-being in the form of

satisfaction depends on the relationship between fishers' beliefs about the expected benefits of fishing and their experience, whereas eudaimonic well-being stems from the satisfaction of basic psychological needs. Fishers' experiences can dynamically affect their cognitions. This model presents numerous assumptions about fishers and the factors that affect fisher behaviour, not all of which are shared across the social sciences, or even within social psychology. However, the model we propose tries to unite a separate literature stream by proposing how key concepts of social psychology are related and how they could be studied together. We hope our framework helps to clarify some of the existing confusion and proposes a united way forward to the next decade of social-psychological research to understand recreational fishing thought and action regarding fisheries resources.

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